

# Capability Replacement Laboratory

## Integrated Safety Management PSF-Plan-ESH-003, Revision 1





**Pacific Northwest National Laboratory  
Capability Replacement Laboratory (CRL) Project**

**Integrated Safety Management (ISM) Plan  
PSF-Plan-ESH-003, Rev. 1**



Approved By: H.R. Vogel  
H.R. Vogel, ES&H Manager

1/9/07  
Date

Approved By: J. McClusky  
J. McClusky, Project Manager

1/9/07  
Date

## Change History

Revision Number	Effective Date	Description of Change
0	5/2/06	Initial issue.
1	12/06	Revised to incorporate project scope changes and comments received on initial version.

## Executive Summary

This document describes the overall approach for implementing Integrated Safety Management (ISM) during the life cycle of the Capability Replacement Laboratory (CRL) project. This ISM plan addresses all phases of the CRL project, with a focus on the areas of safety management support necessary to meet the elements of the project Work Breakdown Structure (WBS).

The plan is supportive of all aspects of the project, but will focus on five of the seven major WBS legs because the major Environmental Safety and Health (ES&H) risk areas are embedded in these areas. They are **PSF HRT Facilities** in the designated “*PNNL Site*” (Horn Rapids Triangle) (WBS element 1.2.02), **PSF 325 Upgrades** (WBS element 1.2.03), **300 Area Infrastructure and Upgrades** (WBS element 1.3.02.), **Privately Financed Facilities** (WBS element 1.3.03) and **Transition** (WBS 1.3.04). This update will be submitted with the Critical Decision-2 (CD-2) package to the U.S. Department of Energy (DOE) for approval. This plan will be updated and revised throughout the project life cycle as needed, or based on routine evaluations that identify needed revisions.

This ISM Plan will accomplish the following objectives:

- establishes the organized system whereby CRL design and construction work is planned, performed and assessed relative to ISM Guiding Principles and Core Functions
- is consistent with or linked to (as appropriate) to the existing, overarching Pacific Northwest National Laboratory (PNNL) Integrated Environment, Safety, and Health (IES&H) (<http://sbms.pnl.gov/program/pd03d020.htm>)
- is consistent with or linked to (as appropriate) related Standards-Based Management System (SBMS) policies, programs, or subject areas
- defines the project strategy for integrating ES&H requirements, regulations, codes/standards and guidance to the various activities of the CRL project
- describes how feedback and improvement related to ES&H is integrated in all aspects of the CRL design and construction
- addresses DOE Order 413.3, *Program and Project Management for the Acquisition of Capital Assets*, guidance for documenting how the CRL project implements ISM requirements.

The CRL project is committed to achieving a high degree of safety and quality through compliance with

- applicable local, state and federal regulations
- the DOE requirements as flowed down to PNNL via the laboratory contract
- PNNL policies, subject areas and procedures (as described in SBMS)
- industry best practices (unique to the CRL project)
- CRL project-specific plans and procedures
- PNNL and project-specific feedback and improvement processes.

## **Acronyms**

A/E	architectural-engineering firm
ALARA	as low as reasonably achievable
BOF	Balance of Facility
CAM	Cost Account Manager
CD	Critical Decision
CDR	Conceptual Design Report
CFR	Code of Federal Regulations
CRL	Capability Replacement Laboratory
DBA	design basis accident
DOE	(U.S.) Department of Energy
DBA	Design Basis Accident
DSA	Documented Safety Analysis
EA	Environmental Assessment
ES&H	Environmental Safety and Health
FHA	Fire Hazard Analysis
HRT	Horn Rapids Triangle
ISM	Integrated Safety Management
IWD	Integrated Work Documents
NPH	Natural Phenomenon Hazard
O	Order
ORR	Operational Readiness Review
PDSA	Preliminary Documented Safety Analysis
PHA	Preliminary Hazard Analysis
PIP	Project Implementation Plan
PMP	Project Management Plan
PRD	Program Requirements Document
PNNL	Pacific Northwest National Laboratory
PNSO	Pacific Northwest Site Office
PHA	Process Hazards Analysis
POA	Plan of Action
PSF	Physical Sciences Facility
QA	quality assurance
R&D	research and development
ROD	Record of Decision
SBMS	Standards-Based Management System
SME	Subject Matter Expert
SOF	Shielded Operations Facility
SSC	structures, systems, and components
TSR	Technical Safety Requirements
WBS	Work Breakdown Structure
WCH	Washington Closure Hanford

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## **1.0 Purpose and Scope**

The Capability Replacement Laboratory (CRL) project is committed to performing all tasks in a safe manner and integrating “safety”<sup>1</sup> as a critical component of project activities. The CRL project was established to maintain key research capabilities currently located in the Hanford Site 300 Area, enabling cleanup activities. Critical Decision-1 (CD-1) approval was obtained for the CRL project in December 2005. This approval authorized the Pacific Northwest Site Office (PNSO) to proceed with project planning and schematic/preliminary design efforts on the Physical Sciences Facility (PSF) complex. Subsequent to that approval, an Options Analysis was performed to determine a feasible path forward for the project scope (CD-0) due to funding constraints. The approval of the Options Analysis, to include retained facilities in the 300 Area, is now the defined path forward for the project.

A Project Management Plan (PMP) has been established for the CRL project that specifies the management objectives and requirements; describes the project organization, line management chain, and the roles and responsibilities of project personnel; and describes how Pacific Northwest National Laboratory (PNNL) will manage the design, construction, operational startup and transition into the CRL within those requirements. This Integrated Safety Management (ISM) Plan further defines how the project activities will be consistent with or linked to (as appropriate) to the existing, overarching PNNL ISM Program (<http://sbms.pnl.gov/program/pd03d020.htm>) to meet the PMP objectives and requirements. It also provides a framework for how the project is integrated with various organizations, implementing documents and procedures within PNNL’s institutionalized programs.

### **1.1 Functional Description of PNNL Integrated Safety Management Systems**

Safety requirements are passed down from DOE through the PNNL operating contract (DE-AC05-76RL01830). This contract defines Clause I-87 that implements DEAR Clause 970.5223-1 – “Integration of Environment, Safety, and Health into Work Planning and Execution” (December 2000). The CRL project is committed to compliance with all state and federal regulations and DOE requirements contained in the operating contract.

PNNL’s existing Integrated Environment, Safety, and Health (IES&H) program defines the delivery of Environmental Safety and Health (ES&H) and Quality functions into the planning, performance and evaluation of work. This program establishes the approach for accomplishing work safely and provides the roadmap of the implementing management systems and processes. Quality requirements for the project are established in the CRL Quality Assurance Program Document (QAPD). The CRL QAPD requirements apply to ES&H activities conducted in implementing this ISM plan in support of the CRL project.

Both the Quality and ES&H programs are carried out through the integration of requirements into processes and systems of appropriate PNNL management systems.

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<sup>1</sup> Throughout this document, the use of the term “safety” will relate to the areas covered under the definition of ES&H functions noted in the overarching PNNL Integrated ES&H program.



Key management systems involved during design and construction of the CRL include

- Acquisition Management
- Environmental Management
- Facility Management
- Facility Safety
- Financial Management
- Human Resources
- Integrated Planning and Assessment
- Project Management
- Quality
- Standards-Based Management System (SBMS)
- Safeguards, Security and Emergency Preparedness
- Worker Safety and Health
- Radiological Control
- Training and Qualification.

These management systems make up the “core programs” that are the foundation for the implementation of ISM during the CRL project. They are supported by program descriptions, policy statements (SBMS), operating procedures and special programs (e.g., Volunteer Protection Program, ISO 14001 Environmental Management System and Lessons Learned).

A key role within the CRL project is that of the CRL ES&H manager, who is to proactively participate in the activities of the project team and recognize when it is necessary to engage reviews, input, or advice on a particular issue from an ES&H subject matter expert (SME). SMEs from PNNL’s institutional management systems have been integrated into the project as matrixed staff. The appropriate SMEs are integrated into design and construction activities as design contributors, technical reviewers and/or project assessors to facilitate implementation of ISM during the CRL project. The ISM plan for the project was developed and will be maintained under Work Breakdown Structure (WBS) 1.1.01.04 and includes periodic revisions to coincide with the CD phases of the project. SME resources from the ES&H management systems are integrated as part of the task-specific WBS (e.g., programming sessions with the architect/engineer, design reviews, permitting, construction, etc.).

The ES&H implementing management systems and processes to be applied to the project include a broad spectrum of technical disciplines and regulatory areas including safety analysis, health physics, radiological engineering, criticality safety, worker safety and health, safeguards and security, emergency planning and environmental protection. Specific project plans and documents may be prepared to address ES&H regulatory requirements and or customer expectations. Examples of project-specific documents that will be prepared include, but are not limited to

- Environmental Assessment
- Permitting Strategy
- Safety Basis Strategy – 325 Building Documented Safety Analysis (DSA)
- Facility Authorization Agreement – 325 Building
- Facility Use Agreements – Horn Rapids Triangle (HRT) facilities
- Readiness Plan (Plan of Action [POA]).

As the CRL project evolves, the expectation is that there may be a need for additional project-specific plans, procedures and records that may be outside the scope of existing PNNL management systems as referenced in this plan. The CRL team and supporting SMEs will identify these conditions, recommend potential solutions and implement appropriate actions as approved by the project manager. The project manager and the appropriate control account manager will be responsible for designating funding to support resources for implementation. As these unique situations arise and project documentation is prepared, its relevancy to the CRL ISM program will be reflected in subsequent revisions and updates to this plan.

During the life cycle of the project regulatory or contractual requirements may be revised or new requirements added that may impact these management systems related to the IES&H program and the CRL project. These changes will be evaluated through PNNL's Requirements Management subject area and actions will be identified to modify management system descriptions, subject areas, plans, or procedures to comply with the required changes. Changes impacting CRL project performance, cost, or schedule will be conveyed to the project manager.

## 2.0 Project ISM Implementation

The PNNL IES&H management program is the institutional system used to manage the conduct of work at PNNL, including the CRL project. This CRL project-specific ISM plan utilizes PNNL's existing management systems to address the safety and protection of workers, the public and the environment in CRL design, construction and startup/transition activities. The guiding principles and core functions of PNNL's IES&H Management program are applicable to the work being performed on the CRL project. The application of these principles and core functions will vary with each work activity or project phase. This document elaborates on the activities that support implementing ISM through each phase of the project and will be updated in parallel with CD steps defined for the CRL project.

This project ISM plan addresses each WBS element and its relationship to safety as noted in section 2.1 (Figure 1, Section 2.1). A focus is on five of the seven major WBS legs, because the major ES&H risk areas are embedded in these areas. There are: **PSF HRT Facilities** in the designated "*PNNL Site*" (Horn Rapids Triangle) (WBS element 1.2.02), **PSF 325 Upgrades** (WBS element 1.2.03), **300 Area Infrastructure and Upgrades** (WBS element 1.3.02.), **Privately Financed Facilities** (WBS element 1.3.03) and **Transition** (WBS 1.3.04).

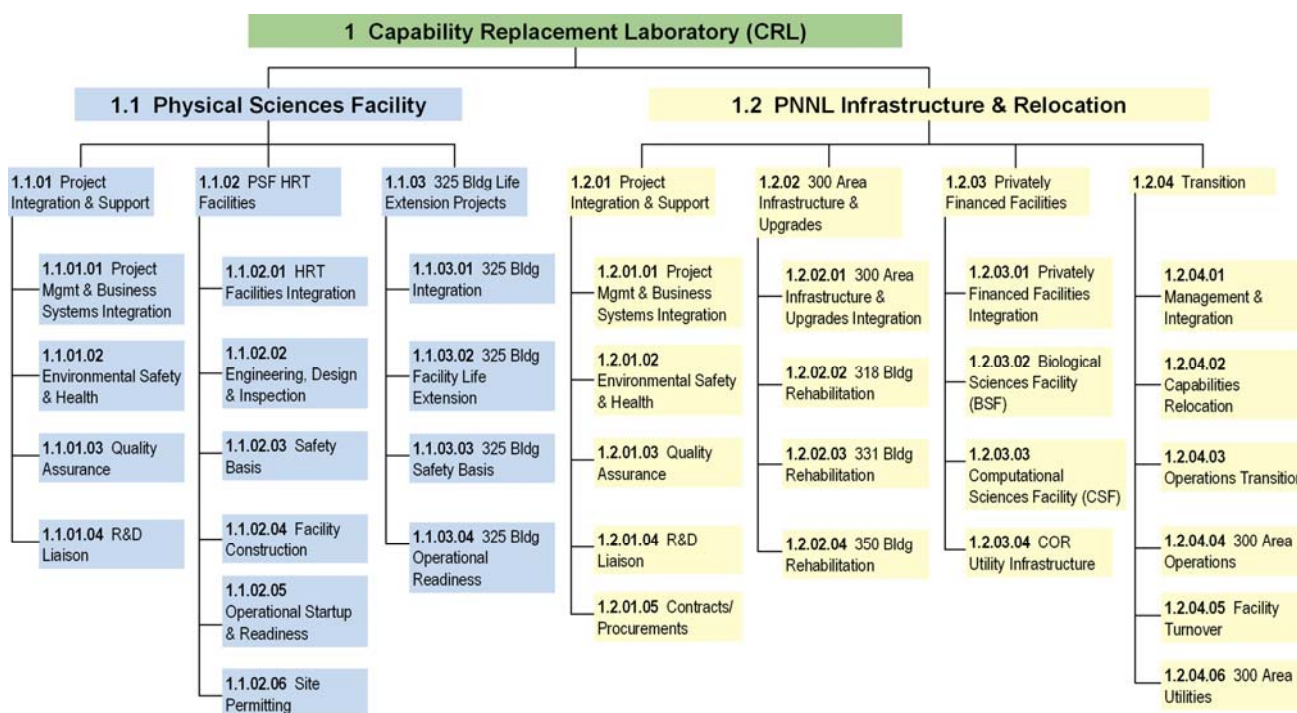
Within each WBS element, activities that relate to a safety management function, responsibility, or authority, a narrative is provided that describes the specific responsibilities and implementing mechanism or organizational/functional responsibilities that addresses each activity. The definition of scope, analysis and identification of hazards, hazards control, performance of work and feedback functions are described in the appropriate WBS elements. A summary of the Feedback and Improvement function will be elaborated on in Section 4 of this plan relative to the integration with the CRL project QAPD Self-Assessment function.

This plan will be updated and revised throughout the project life cycle as needed, or based on routine evaluations that identify needed revisions.

### 2.1 Project WBS Elements and Their Relationship to Safety

Each major project WBS element has identified hazards associated with their performance. Many of these activities are already encompassed by current, lab-level IES&H Program requirements and the lab-level program. As noted in each of the following subsections, where applicable, project-specific documents or additional project plans are defined that supplement the overall lab-level program.

The CRL project WBS is defined by the following elements (Figure 1):



**Figure 1.** CRL Project Work Breakdown Structure (WBS)

### 2.1.1 CRL Project Director (WBS 1.0)

The PNNL project director ensures all members of the CRL workforce possesses the experience, knowledge, skills and abilities necessary to discharge their responsibilities. Each cost account manager (CAM) is responsible for the activities defined in their respective WBS dictionaries and ensures staff working within the respective WBS element are competent to perform their assigned work safely and in an environmentally responsible manner, including performing work activities and producing results in compliance with all applicable ES&H laws and regulations. The training and qualification of CRL project staff is addressed by the CRL QAPD and the related implementing procedures. The competencies of ES&H SMEs that are matrixed to the project from the PNNL ESH&Q Directorate are commensurate with their responsibilities as defined in *The Safety and Health Department Technical Staff Training and Qualification Program* (PNL-MA-858).

Overall, the WBS element CAMs' responsibilities related to ISM include

- Integrate the ISM guiding principles to effectively achieve core functions associated with CRL work activities.
- Implement CRL project procedures and PNNL SBMS subject areas.
- Perform only work authorized by line management.
- Understand and follow operational requirements and restrictions related to work assignments.
- Promote safety by reviewing all tasks commensurate with the level of risk, elevate potential issues through project management personnel and incorporate lessons learned.

Contractor organizations will address the qualification of their staff and subcontractors within task-specific project documents (e.g., Quality Assurance Plans; Construction Health and Safety requirements as outlined in contract Statements of Work [SOWs]). The training and qualifications of these employees will be commensurate with their assigned duties.

## **2.1.2 WBS 1.1 - Physical Sciences Facility**

Within this WBS element there are three legs, one of which is WBS 1.1.01 – Project Integration and Support, is predominantly management and coordination functional area. The other two legs of the WBS element, 1.1.02 – PSF HRT Facilities, and WBS element 1.1.03 – Building 325 Life Extension Project, contain actual capability replacement functions.

### **2.1.2.1 WBS 1.1.01 – Project Integration and Support**

This element contains the following representative hazards:

- office environments
- ergonomic concerns.

As noted in the SBMS subject area on Office Safety, the following list of practices reflect either regulatory requirements or represent commonly accepted office safety concepts for a safe office environment: aisles and floors; electrical equipment; emergency preparedness; falls; fire hazards (including coffee pots, holiday decorations, paper storage and space heaters); handling and disposing of broken objects and sharps; hazards of office furniture and equipment; housekeeping; lifting or pushing; slips and trips.

These types of hazards within the CRL project are dealt with in the same manner as other office environments at PNNL, utilizing existing SBMS practices and procedures. No special controls related to these hazard types are necessary for the CRL project under this WBS element. Feedback relative to the performance in this WBS element will be part of routine management assessments conducted by the appropriate line managers as outlined in the project QA Self-Assessment Plan.

### **2.1.2.2 WBS 1.1.02 – PSF HRT Facilities**

The PSF HRT will be located on the U.S. Department of Energy (DOE) Office of Science's (SC's) PNNL site. The PSF HRT will consist of the five buildings listed below.

1. Building 3410, Materials Sciences & Technology (MS&T)
2. Building 3420, Radiation Detection
3. Building 3425, Deep Laboratory
4. Building 3430, Ultra-Trace
5. Building 3440, Large Detector Laboratory

The buildings will house both general office and laboratory space. Laboratory spaces are specified for specific experimental work based on current work in the Hanford 300 Area.

This element represents activities aligned with design, construction and transition/operations of the new facilities and includes the following representative hazards:

- office environments
- ergonomic concerns
- laboratory hazards (as defined in the PNNL Integrated Operations System (IOPS) hazards identification/awareness process)
- transportation
- design and engineering
- construction
- startup.

During transition and operations, office environments, ergonomic concerns, laboratory hazards and transportation (associated with the movement of materials and existing equipment) will be addressed utilizing existing PNNL SBMS practices and procedures, to include the deployment of the IOPS tool in the new facilities.

A Hazard Analysis Report (HAR) satisfies the hazard analysis documentation requirements associated with CD-2 of the DOE acquisition process defined in DOE O 413.3A, *Program and Project Management for the Acquisition of Capital Assets*. This HAR also 1) meets the documentation requirements for a radiological facility in Table 2-2 of PNL-MA-440, Safety Analysis, Section 2.0, *Facility Hazard Classification*, and 2) supports the Radiological Facility determination of PSF-TECH-ESH-002, *Hazard Category Determination for the Physical Science Facility*.

The design and engineering and construction-related functions of this WBS element will be addressed utilizing Facilities & Operations (F&O)-based procedures, as described in the revised PNNL Construction Safety Management program. This will represent one of the largest construction activities at PNNL, surpassing that of the W.R. Wiley Environmental Molecular Sciences Laboratory (EMSL) construction in the early to mid 1990's. As well, Battelle will function as the "prime" construction management lead for the project.

The purpose of the Construction Safety Management program is to describe the PNNL management processes, implementing methods and roles deployed on a project-by-project basis. The program, to the greatest extent possible, integrates the management of safety, health, and environmental protection, both in terms of personnel and management methodologies, with the other primary elements of construction project performance: quality, cost and schedule. Under the terms of the Battelle-Hanford Atomic Metal Trades Council (HAMTC) bargaining unit agreement, work that is beyond the resources of PNNL maintenance staff may be subcontracted to another company that is capable of doing the work. For those reasons PNNL construction work as defined in this program description is contracted to other companies. For subcontracted construction work, PNNL retains overall responsibility for ensuring that construction activities conducted on behalf of PNNL are performed in compliance with worker safety and health and environmental protection requirements. This is accomplished through appropriate contract provisions, construction design and specifications and overview of construction activities. The objective of the PNNL construction safety program is to promote the prevention of injury or illness to contractor employees, protect PNNL staff members and real property assets and prevent and minimize environmental impacts when contractors perform construction work for PNNL. Environmental impacts are prevented or minimized by reducing or preventing waste, liquid effluents and air emission generation and complying with all environmental permits and approvals, whether issued by the laboratory or applicable regulatory agency.

The Construction Safety Management program provides a general description of and a roadmap to the processes, procedures and roles for implementation of construction safety management at PNNL. Construction safety management involves effective management leadership; worker and subject matter expert involvement in appropriate aspects of work planning and control; defining the scope of work; hazard identification, including identification of potential environmental impacts; identification of requirements and standards, including tailoring of requirements to the specific scope of work; authorizing work and performing work within the limits of the authorization and using applicable tailored hazard controls; and finally, effective feedback and improvement throughout all phases of the process. While PNNL administers this internal program and performs tasks that support construction contractor worker safety and health and protection of the environment, all construction contractors and subcontractors are expected to be directly responsible, accountable for, and personally involved in, the safety and health of their employees and implementation of appropriate environmental protection during the performance of construction work activities for PNNL. PNNL provides ES&H oversight of all projects but does not perform direct services for contractor personnel except to support work with unique hazards. Unique hazards include those associated with beryllium and radiological work.

Construction projects managed by F&O are guided by internal operating procedures including ADM-016 “Facility and Operations Maintenance Work Control Procedure,” ADM-CM-055 “Facilities & Operations Project Management Manual,” and ADM-CM-058 “Facility Design Manual.” To the extent those F&O procedures are not applicable (e.g., construction work not managed by F&O), or if the scope of work exceeds the scope of the procedures, implementation of this Construction Safety Management program may involve project-specific documents such as the Project Management Plan, project-specific Integrated ES&H Management (ISMS) plan and/or project-specific Quality Assurance Plan.

Internal reviews of design submittals related to the CRL project utilize the same structure of the Facilities Review Board (FRB) as defined in ADM-CM-058, but with a much broader representation of ES&H SMEs, with their reviews coordinated and executed under the direction of the CRL ES&H Manager. An appointment letter, outlining the functions and expectations of these SMEs, signed by the CRL project Director, is the mechanism that documents this process. Reviews are documented in accordance with the CRL QAPD, and formally documented and addressed per the PSF-PROC-PM-301 - *Design Control and Technical Reviews* procedure, which includes the use of Document Review Record forms for comment documentation and assurance of adequate resolution.

Additional training and qualification packages will be developed for those staff involved in the physical construction of the facilities, ensuring that DOE and Battelle management requirements and expectations with respect to safety performance are clearly addressed prior to, and as part of, ongoing work-related activities. The “flow down” of these expectations are included in the different phases and documents associated with subcontracts, such as General Provisions, terms and conditions, task-specific SOWs, job-planning packages (JPPs) and job safety analyses (JSAs). Each facet of this subcontracting process is performed with the oversight and interaction of a construction safety representative as it relates to the Construction Safety Management program flow or logic.

Environmental considerations/impacts of the construction activity are accounted for in two areas, one being related to the National Environmental Policy Act (NEPA) process, the other in the Leadership in Energy and Environmental Design (LEED) certification of the buildings. These environmental considerations are coordinated through the ES&H support function of the project, in conjunction with the Environmental Management System functions of PNNL.

Feedback and improvement relative to the performance in this WBS element will be part of routine management assessments, site-specific assessments, field walk-downs by construction safety and other ES&H SMEs and control account manager CAM assessments in their “line manager” roles. Issues or actions will be documented and addressed as required by the CRL project QAPD and / or the PNNL self-assessment and corrective action management functions described in SBMS. The self-assessment plan is prepared by the Project QA Manager and approved by the CRL project Director. A matrix of planned assessments is included in Attachment 1 to this document.

#### **2.1.2.3 WBS 1.1.03 – Building 325 Life Extension Projects**

This element represents activities aligned with design, construction and operations of the existing facility, and includes the following representative hazards:

- office environments
- ergonomic concerns
- laboratory hazards (as defined in the PNNL IOPS hazards identification/awareness process)
- design and engineering
- construction

Office environments, ergonomic concerns and laboratory hazards will be addressed utilizing existing PNNL SBMS/325 Building Operations practices and procedures, to include the IOPS tool. Design and engineering and construction will be handled in the same manner as described in WBS element 1.1.02 (Section 2.1.2.2 of this document).

Potential changes or modifications to existing systems or operations in the 325 Building will be reviewed and assessed following the nuclear safety requirements and procedures, such as the Unreviewed Safety Question (USQ) Program Description (<http://sbms.pnl.gov/program/pd25d010.htm>). The Facility Design Manual, ADM-CM-058, provides the administrative link into the 325 Building unresolved safety question process for facility modifications/engineering changes.

Feedback and improvement relative to the performance in this WBS element will be part of routine 325 Building management assessments, field walk-downs by construction safety and other ES&H SMEs and Cost Account Manager assessments in their “line manager” roles. Issues or actions will be documented and addressed in accordance with the CRL project QAPD and/or the 325 Building self-assessment and corrective action management functions described in the 325 Building Operations manual.

### **2.1.3 WBS 1.2 - PNNL Infrastructure and Relocation**

Within this WBS element there are four legs, one of which, WBS 1.2.01 – Project Integration and Support, is predominantly management and coordination functional area. The other three legs of the WBS element, 1.2.02 – 300 Area Infrastructure and Upgrades, WBS element 1.2.03 – Privately Financed Facilities, and WBS element 1.2.04 – Transition, contain actual capability replacement functions.

#### **2.1.3.1 WBS 1.2.01 – Project Integration and Support**

This WBS element is functionally the same in hazard scope, work performance and feedback as WBS element 1.1.01 (Section 2.1.2.1 of this document).

#### **2.1.3.2 WBS 1.2.02 – 300 Area Infrastructure and Upgrades**

The scope of this WBS element includes routine modifications and maintenance activities associated with the remaining retained facilities in the 300 Area. There are no additional hazards that are unique to normal F&O operations currently in place for these types of activities, or otherwise covered under existing PNNL SBMS or F&O-specific work controls/practices. These activities will be managed under the current PNNL IES&H program, to include the feedback mechanisms that exist in F&O and ES&H.

#### **2.1.3.3 WBS 1.2.03 – Privately Financed Facilities**

The activities associated with this WBS element are very similar to those of the PSF HRT Facilities construction (WBS 1.2.02; section 2.1.2.2 of this document) except for the actual construction execution. This element represents activities aligned with design, construction and transition/operations of the new facilities, and includes the following representative hazards:

- office environments
- ergonomic concerns
- laboratory hazards (as defined in the PNNL IOPS hazards identification/awareness process)
- transportation
- design and engineering

- construction
- startup.

Office environments, ergonomic, laboratory hazards and transportation will be addressed utilizing existing PNNL SBMS practices and procedures, to include the deployment of the IOPS tool in the new facilities.

The design and engineering-related functions of this WBS element will be addressed utilizing F&O-based procedures, as noted in WBS 1.2.02. Flow down of construction performance expectations will be done through formal contract language, because the execution of the actual construction management for this element will be performed by a third-party contractor – not PNNL staff.

Expectations are for the construction contractor to have in place a program that delivers results similar to that of the revised PNNL Construction Safety Management program. The construction contractor will be evaluated with respect to prior project safety performance and their overall safety record. The “flow down” of these expectations are included in the different phases and documents associated with sub-contracts, such as general provisions, terms and conditions, task-specific SOWs. Each facet of this subcontracting process is performed with the oversight and interaction of a construction safety representative, as applicable, with respect to the contract language and performance relative to their approved construction safety program.

PNNL will oversee construction management activities and construction subcontractors in accordance with the specified terms and conditions of the construction contract and consistent with implementation of the respective Construction Safety program. Any contractor performing construction activities on the CRL project must submit a Health and Safety Plan per contractual requirements. PNNL’s construction safety specialist will review the plan to verify all applicable PNNL requirements are met. After comments are incorporated and the plan is deemed suitable, the plan will be approved. All other activities that may be required prior to initiating the construction of CRL will require PNNL approval and oversight (e.g., during the preliminary design phase, some drilling activities may be performed at the proposed site for seismic or hydrogeologic characterization).

Feedback and improvement relative to the performance in this WBS element will be part of routine construction safety, ES&H SME and CAM assessments as outlined in the respective construction contracts. Issues or actions will be documented and addressed in accordance with the self-assessment and corrective action management functions described in SBMS and the respective subcontract language.

#### **2.1.3.2 WBS 1.2.04 – Transition**

This WBS element contains six subactivities, to include the capabilities relocation activity (1.2.04.02), which will support the physical relocation of current operations/R&D activities in the facilities to be vacated in the 300 area. Other subelements of the WBS relate to ongoing infrastructure support (utilities) and physical turnover of buildings to the D&D contractor. The hazards associated with the relocation actions include.

- laboratory hazards (as defined in the PNNL IOPS hazards identification/awareness process)
- transportation.

PNNL staff routinely manage packaging, transportation and relocation of laboratory assets to include hazardous materials and sophisticated/complex instruments or laboratory installations. The only difference in this WBS element will be the sheer volume or scope associated with the relocation efforts. The project will complete construction of the new facilities in a time phased manner, whereby the entire inventory of materials and equipment that will be relocated or transferred from PNNL custodianship will be more manageable – lab-by-lab and facility-by-facility planning and relocation efforts will be able to be planned and supported with predominantly internal support, minimizing the need for additional subcontracted (or unfamiliar) support staff.



The actual planning and execution of these activities will be conducted throughout the transition period, with additional details to be included in later revisions of this ISM Plan as appropriate.

Work done under this WBS element will also be controlled by inter-contractor agreements (e.g. Washington Closure Hanford [WCH] performance baseline) that articulate expectations for the level of documentation and status of facilities/lab spaces prior to transition.

Staff will be able to address changing hazards in and around their respective laboratory spaces by updating their hazards identification checklists in the IOPS tool and subsequently populating their new spaces with hazards in the same way. The transition activity relative to the new spaces will also be controlled and managed under the Operational Startup and Readiness activity of WBS element 1.1.02.05 (under section 2.1.2.2 of this document), whereby no activity will be allowed to be initiated in its new location without some type of readiness verification. The loading of the new facilities will be done in accordance with the principles of “Start Clean/Stay Clean” as defined in the PNNL SBMS Record of Decision for this set of DOE expectations. The Environmental Management System, with support from the Worker Safety and Health Management System, controls various aspects of the hazardous materials disposition and transportation, to include additional requirements or expectations of the program. The CRL CAM for this WBS coordinates the execution of this WBS, with full support of SMEs from F&O and ES&H.

Feedback and improvement relative to the performance in this WBS element will be part of routine management assessments, facility-specific assessments and other ES&H SMEs and CAM assessments in the form of “activity-based” assessments. Issues or actions will be documented and addressed in accordance with the PNNL self-assessment and corrective action management functions described in SBMS.

## **2.2 ES&H Activities**

PNNL and DOE expect that all aspects of the CRL project will be conducted in accordance with applicable federal, state and local regulations related to ES&H. This will be accomplished through implementation of ISM throughout the project life cycle. An initial crosswalk of project ES&H activities related to ISM functions is provided in Table 1. This generalized overview of the relationship of the core functions and the PNNL management systems as they relate to ES&H support to this project was used as the initial template for design, construction and transition activities. As now defined in the specific CRL project WBS elements, ES&H support is “purchased” via the interaction of individual CAMs with the CRL ES&H manager for appropriate levels of ES&H support (SMEs, permits, documentation) necessary to accomplish the defined objectives (reflected in the individual WBS dictionaries) in the element scope.

### 3.0 ISM Integration in the CRL Project

The process of integrating and tailoring the design requirements into detailed specifications and drawings for CRL will involve the use of institutionalized management systems at PNNL to address specific work activities and their associated hazards. Reference to how key CRL design documents contribute to effective implementation of IES&H core functions and guiding principles is provided in Table 1. These inputs to the design come from a wide variety of sources, including the following:

- PNNL DOE contractual requirements
- federal, state and local regulations
- DOE orders, directives and guidance documents
- safety analyses
- industry codes and standards
- PNNL engineering guides
- lessons learned
- SBMS
- SMEs
- facility use agreements (FUA)
- PNNL users (research, operations and maintenance, building management)
- Safeguards and Security

As described in Section 2 of this document, with respect to each WBS element where the design process is noted, ES&H codes and standards are integrated. The FRB approach, as described in section 2.1.2.2 of this plan, utilizes safety analysis, value engineering, trade studies or a combination of these processes to identify creative and innovative solutions for elimination or mitigating hazards. Any feedback that would improve or be of benefit to the safety, security or functionality of the facility will be incorporated into the design criteria/requirements with concurrence from the Design Authority.

By incorporating ISM concepts early in the design process, such as the LEED certification process and ES&H SME involvement in the programming process and design review, there is an increased opportunity to positively impact the design to incorporate safety considerations early into the process. As the project progresses through preliminary and final design, the cost of any proposed changes increases, but must be balanced with the cost of a particular re-design due to the proposed change and benefit it might create in enhancing safety. Again, with the early involvement of ES&H SMEs in this activity, the likelihood of a significant change is decreased.

The CRL project is committed to gathering and considering the application of relevant lessons learned from a wide range of sources. Incorporating applicable lessons learned enables the CRL design to go beyond compliance to incorporate the valuable experience of peers within the DOE community, as well as general industry. As part of the design process there will be multiple internal PNNL programming sessions and design reviews scheduled during the preliminary design phase. In the context of ISM, reviews will be performed to verify the elimination or mitigation of potential hazards and evaluate the appropriate application of standards, DOE Orders, regulations and PNNL requirements. Design reviews are required to be performed in accordance with the CRL QAPD procedure CRL-PROC-PM-301, *Design Control and Technical Reviews* and Facility Management processes defined in ADM-CM-058, *Facility Design Manual*.

**Table 1.** Crosswalk of ISM Functions to CRL Design Documents

ISM Function	Conceptual Design	Preliminary Design	Final Design	Construction	Startup/Transition
<b>Define the Scope of Work</b>	<ul style="list-style-type: none"> <li>Mission Need Statement (8/2004) CD-0</li> <li>300 Area Replacement Facilities Project Design Criteria (2/2005, Rev. 1)</li> <li>Project Execution Plan- CRL project (5/2005)</li> </ul>	<ul style="list-style-type: none"> <li>Conceptual Design Report (6/2005)</li> <li>CD-1 Approval (12/2005)</li> <li>Updated PHA (3/2006) and Safety Basis Review Team (SBRT) review comments on the document</li> <li>CRL project CRL Project Implementation Plan (PIP) (5/2006)</li> </ul>	<ul style="list-style-type: none"> <li>Updated CRL PIP (as required)</li> <li>Preliminary Design and CD-2a/3a approval.</li> <li>DOE input to overall Safety Basis Strategy</li> </ul>	<ul style="list-style-type: none"> <li>Updated CRL PIP (as required)</li> <li>Final Design and CD-3 Approval</li> <li>PNNL Construction Safety Management program.</li> <li>Subcontractor Health and Safety Plan</li> </ul>	<ul style="list-style-type: none"> <li>Update CRL PIP (as required)</li> <li>Final as-built facility design</li> <li>Development of CRL administrative, testing, operating and maintenance</li> <li>CRL Startup and Turnover schedules WBS Dictionaries</li> <li>Final Environmental permit approvals to operate CRL and regulatory conditions/ limitations</li> </ul>
<b>Analyze Potential Hazards</b>	<ul style="list-style-type: none"> <li>Risk Management Plan</li> <li>PHA for Shielded Operations Facility</li> <li>Initial Facility Hazard Categorization</li> </ul>	<ul style="list-style-type: none"> <li>Updated PHA (3/2006)</li> <li>PHA for CRL</li> <li>NEPA Environmental Assessment</li> <li>Draft Environmental Permit Applications</li> <li>Preliminary shielding, dose and ALARA assessments</li> </ul>	<ul style="list-style-type: none"> <li>Environmental permits</li> <li>Update shielding, dose and ALARA assessments</li> <li>Update NPH</li> </ul>	<ul style="list-style-type: none"> <li>PNNL Construction Safety Management program</li> <li>Construction hazards identified.</li> <li>Field changes during construction evaluated to determine impacts to safety, DSA and process hazards identification established in final design.</li> </ul>	<ul style="list-style-type: none"> <li>Evaluate hazards of moving equipment/materials from 300 Area to CRL.</li> <li>Development of CRL administrative, testing, operating and maintenance</li> </ul>

ISM Function	Conceptual Design	Preliminary Design	Final Design	Construction	Startup/Transition
<b>Develop Design Controls/ Requirements</b>	<ul style="list-style-type: none"> <li>300 Area Replacement Facilities Project Design Criteria (2/2005, Rev.1)</li> <li>Conceptual Design Report (6/2005)</li> </ul>	<ul style="list-style-type: none"> <li>Facility design integrated with Preliminary Hazards Analysis.</li> <li>Preliminary shielding design</li> <li>Finalized Natural Phenomena Hazard Report</li> <li>Finalized Critical Safety Evaluations</li> </ul>	<ul style="list-style-type: none"> <li>SSC requirements defined.</li> <li>Codes/standards verified and incorporated into final design requirements.</li> </ul>	<ul style="list-style-type: none"> <li>Construction specifications and final design available to support construction activities.</li> <li>Controls established for mitigating construction hazards.</li> </ul>	<ul style="list-style-type: none"> <li>Finalized as-built facility drawings</li> <li>Development of CRL administrative, testing, operating and maintenance procedure</li> <li>Facility Use Agreement (FUA)</li> </ul>
<b>Perform Work/Design</b>	<ul style="list-style-type: none"> <li>Conceptual Design Report (6/2005)</li> <li>PHA of Shielded Operations Facility.</li> <li>CD-1 package</li> </ul>	<ul style="list-style-type: none"> <li>Preliminary facility and systems design documents generated.</li> <li>Hazards Analysis</li> </ul>	<ul style="list-style-type: none"> <li>Facility and system final design package developed.</li> <li>Environmental permit applications submitted and approved (as required to enable construction activities)</li> </ul>	<ul style="list-style-type: none"> <li>Construct facility to final design specifications.</li> <li>Obtain approvals of engineering changes made during design.</li> <li>Update final designs to as-built conditions</li> </ul>	<ul style="list-style-type: none"> <li>Move personnel/equipment from 300 Area.</li> <li>Perform Readiness Activities for balance of facilities</li> <li>Finalize and implement CRL administrative, testing, operating and maintenance procedure</li> <li>Develop authorization agreement</li> </ul>
<b>Review, Feedback, Improvement and Validation</b>	<ul style="list-style-type: none"> <li>Internal PNNL design reviews.</li> <li>DOE review and approval of CD-1 (12/2005)</li> <li>SC-1.3 CRL Project Review (1/2006)</li> <li>Update of PHA (3/2006)</li> </ul>	<ul style="list-style-type: none"> <li>Internal PNNL design reviews.</li> <li>NEPA public comment and PNSO approval of Findings of No Significant Impact.</li> <li>Integrated Project Team review.</li> <li>DOE review and approval of CD-2/3A package</li> </ul>	<ul style="list-style-type: none"> <li>PNNL internal design reviews.</li> <li>DOE review of CD-3 final design package.</li> <li>Regulatory review (and public comment) of environmental permit applications</li> </ul>	<ul style="list-style-type: none"> <li>PNNL review/oversight of construction activities.</li> <li>Regulatory review of as-built construction against permit approvals.</li> <li>DOE/external review of construction activities</li> </ul>	<ul style="list-style-type: none"> <li>SC review/approval of final DSA and SER</li> <li>PNNL Management Self-Assessment on SOP and BOP</li> <li>Regulatory authorization to operate CRL under environmental permits</li> <li>Walk-through and validation of CRL administrative, testing, operating and maintenance procedure</li> </ul>

## **4.0 Providing Feedback and Improvement**

The CRL project utilizes PNNL's self-assessment program including the F&O and 325 Building self-assessment processes, contractor processes and the CRL QAPD-related assessment and inspection activities described in this section. These processes include feedback and improvement on the adequacy of hazard controls and the planning and execution of the work. Feedback is collected through the PNNL safety inspection and oversight processes and the contractors' pre-job and post-job meetings. Feedback is also accomplished by routine and exception reporting mechanisms such as reports of hours worked and reports of incidents and accidents and project interfaces with the PNNL Lessons Learned program. Feedback and improvement on the adequacy of hazard controls, planning and execution of the work is collected by line management interactions in the field, with additional information collected via the PNNL safety inspection oversight process, pre-job and post-job meetings.

Specific metrics or feedback that will be collected and reported on will be related to project and staff performance in the areas of

- established project scope and performance
- annual budgets, including making decisions on mission-safety trade-offs
- implementation of DOE safety rules, directives and standards assigned safety management roles and responsibilities, establishment of contracts, including delineation of safety requirements
- safety culture for effective ISM system implementation
- nuclear safety requirements and authorization agreements, performance related to readiness activities
- maintaining operational awareness
- monitoring performance of corrective action
- performance of self-assessments activities per the assessment plan, performance of oversight of sub-contractor work activities
- annual ISM updates and ISM effectiveness reviews annual performance objectives, performance measures and commitments.

The requirements for providing feedback and improvement are included in SBMS and other controlled documents such as

- SBMS –Planning, Assessment and Analysis
- SBMS – Assessment Management
- SBMS – Lessons Learned and Best Practices
- IOPS assessment functions
- CRL QAPD
- ADM-CM-055, Project Management Manual.
- SHP-6.02- Contractor Event Recordkeeping and Reporting Requirements, PNL-MA-858.
- SHP-8.02- Contractor Safety Performance Evaluation, PNL-MA-858. Elements of Feedback and Improvement.

Reporting on feedback and improvement opportunities, performance objectives and overall assessment activities will be coordinated with the CRL QA Manager and linked to the project self-assessment plan and reporting functions.

## **Project Management**

- R2A2 - identified, assigned, performance
- PMP/ISMS - project documentation addresses CF/GP
- Schedule/priorities - Key ISMS-related activities are performed on-time and with acceptable results.

## **Design**

- SME involvement - evidence that appropriate SMEs are involved in appropriate activities, evidence that comments are generated and resolved (with due consideration for "professional difference of opinion")
- Use of Lessons Learned in design - evidence that lessons learned have been sought out and incorporated into design
- Assessment of key functional areas of design - FP, operational safety, construction safety, industrial hygiene (ventilation, confined space, lighting, hazardous material management), electrical safety.

## **Construction**

- Contractor selection.

Monitoring/overview, feedback and improvement - regular inspections (workspace and activity), corrective action management, lessons learned generated and used

## Attachment 1—DRAFT CRL Project FY07 Self-Assessment Matrix

CRL Project FY 2007 Assessment Plan								
Type <sup>1</sup>	Sub-type <sup>2</sup>	Owner <sup>3</sup> (Assessor)	Assessment Title	Key Question Answered/Purpose	Related Project Outcome(s)/ Objective(s)	ATS#	Frequency/ Target Date <sup>4</sup>	Completed/ Deleted/ Added since last report <sup>5</sup>
E	Topical	Proj. Director	Lehman Review of CD-2a/3a Package	- Determine readiness of CRL project to implement CD-2a/3a phase	Proceed with project beyond CD-2a/3a stage.		1/30 – 2/1/2007	
E	Topical	Project Controls	EVMS Review	- Determine readiness of project EVMS for certification	Proceed with project using EVMS		2 <sup>nd</sup> Quarter FY07	
E/I	Topical	Project Director	EIR of CRL Project CD-2a/3a Package	- Determine readiness of CRL Project to implement CD-2a/3a phase	Proceed with project beyond CD-2a/3a stage.		March 2007	
M	Line Review	Project Director	PEMP Measures Status Review	- Ensure project performance is on track with PEMP measures	Ensure accomplishment of key project milestones		Quarterly	
M	Project Review	Project Controls (Nickola)	Project Risk Reviews	- Ensure risks are being managed on an ongoing basis (i.e., risks are being identified/updated, mitigated, closed)	Ensure that risks continue to be within an acceptable range.		Monthly, Quarterly	
S	Project Review	ESH Mgr. (Various ES&H SMEs)	LEED Certification	- Ensure new facility design and construction is consistent with criteria for LEED Certification.	Obtain LEED Certification.		Quarterly	
S	Project Review	ESH Mgr. (Various ES&H SMEs)	ISM Project-specific Plan Implementation	- Ensure five core ISMS-related processes and associated activities are performed on-time and with acceptable results.	Ensure project safety performance consistent with established PNNL goal.		Annual	
S	Project Review	ESH Mgr. (Various ES&H SMEs)	Contractor Safety	- Ensure contractor safety performance scores are consistent with established safety performance criteria/scores.	Ensure project safety performance consistent with established PNNL goal.		Quarterly	
Q	QA Audit	QA Officer (Crisp)	Supplier QA Evaluation Audit – SCM	Audit of SCM's NQA-1 capabilities	To approve SCM as a provider of NQA-1 engineering services for the project.	N/A	January 2007	
Q	QA Audit	QA Officer (Crisp – Lead w/Maday)	Supplier QA Implementation Audit – Flad	Audit of Flad's QA program implementation	Provide continuing evidence that Flad is complying with QA requirements.	N/A	May 2007	
Q	QA Surv. 07-001	QA Officer (Crisp)	Internal QA Surveillance	Review differences in cost estimates between Flad and ARES	Establish lessons learned based on reason for the differences.		December 2006	

### CRL Project FY 2007 Assessment Plan

Type <sup>1</sup>	Sub-type <sup>2</sup>	Owner <sup>3</sup> (Assessor)	Assessment Title	Key Question Answered/Purpose	Related Project Outcome(s)/ Objective(s)	ATS#	Frequency/ Target Date <sup>4</sup>	Completed/ Deleted/ Added since last report <sup>5</sup>
Q	Surv. 07-002	QA Officer (Crisp)	Internal QA Surveillance	Ensure Seismic Analysis Study (325 Building) addresses QA requirements.	Provide evidence that QA requirements are complied with.		December 06 – March 07	
Q	QA Surv. 07-003	QA Officer (Crisp)	Supplier QA Surveillance	Ensure Flad revised QA program and procedures address QA requirements.	Provide evidence that QA requirements are complied with.		Jan 2007	
Q	QA Surv. 07-004	QA Officer (Crisp)	Supplier QA Surveillance	Ensure Flad effective implementation of Flad revised QA program and procedures.	Provide evidence that QA requirements are complied with.		Feb 2007	
Q, CM	Surv.	QA Officer (Nickola)	Internal QA Surveillance	Ensure Document Control activities effectively implement QA and CM requirements.	Provide evidence of satisfactory QA program implementation		April 2007	
Q, CM	Surv.	QA Officer (Nickola)	Internal QA Surveillance	Ensure Records Management activities effectively implement QA and CM requirements.	Provide evidence of satisfactory QA program implementation		May 2007	
Q,S, CM	Surv.	QA Officer (Nickola)	Internal QA Surveillance	Ensure Qualification and Training of Personnel activities effectively implement QA, ISMS and CM requirements.	Provide evidence of satisfactory QA program implementation		June 2007	
Q, S, CM	Surv.	QA Officer (Crisp)	Internal QA Surveillance	Conduct of Design Reviews - Ensure appropriate SMEs are involved in appropriate design review activities and that comments are generated and resolved with due consideration for professional differences of opinion. - Ensure key functional areas of design are addressed (e.g., operational safety, construction safety, etc.) - Ensure lessons learned have been sought out and incorporated into design.	Provide evidence of satisfactory QA program implementation		July 2007	
Q	Surv.	QA Officer (Nickola)	Internal QA Surveillance	Project Acquisition Controls	Provide evidence of satisfactory QA program implementation		August 2007	
Q	QA Audit	QA Officer (TBD)	QA Program Audit	Independent internal audit of the QA program	Provide evidence that the QA program is being implemented as intended.		Annually – starting 11-13 months from QA program development (1/4/07)	



## CRL Project FY 2007 Assessment Plan

Type <sup>1</sup>	Sub-type <sup>2</sup>	Owner <sup>3</sup> (Assessor)	Assessment Title	Key Question Answered/Purpose	Related Project Outcome(s)/ Objective(s)	ATS#	Frequency/ Target Date <sup>4</sup>	Completed/ Deleted/ Added since last report <sup>5</sup>
M	Mgmt. Assess.	Proj. Director (Smith)	Project Management Assessment	Assess the overall project's project management function adequacy and effectiveness of implementation. Include assessment of R2A2s (identified, assigned, performed) and QA program (adequacy, effectiveness of implementation).	Provide evidence that the project management function, including QA program, is adequate and effective.		Annually – starting 13-15 months from project development	

Notes/Instructions:

1. Type: (E) External, (I) Independent (IA/IO), (V) Management System Verification- Extent of Deployment, (M) Management, (Q) NQA-1 Quality Assurance, (S) Safety - Integrated Safety Management System, ISMS, verification, (CM) – Configuration Management.
2. Type:
  - If the Type (column 1) is “**External**” (E), Sub-Type (column 2) must be one of the following: Topical or Regulatory
  - If the Type (column 1) is “**Independent**”, enter a one – two word descriptor for Sub-Type (column 2)
  - If the Type (column 1) is “**Management System Verification**” (V), enter a one – two word descriptor for Sub-Type (column 2)
  - If the Type (column 1) is “**Management**” (M), Sub-Type (column 2) must be one of the following: Line, Activity, Space-based, Project/Program/Peer review, Initiative or Measurement, analysis and process
3. Assessment Owner: Individual responsible for performance of this assessment
4. Frequency/Target Date: Note frequency or approximate date to conduct the assessment
5. Completed/Deleted/Added: indicate if the assessment was **completed** since the last update (C), **deleted** from plan since the last update (D ... don't delete the entry; indicate it was deleted from plan by placing a “D” in the cell which means you've chosen not to conduct this assessment), or note that it is an assessment that's been **added** to your plan since last update (A); if the assessment was both **added and completed** since the last update, please make both notations (A/C).

## Attachment 2— CRL Project ISM Plan Continuous Improvement Agenda

This attachment will be updated on an annual basis to provide an integrated approach to address the initial efforts to elevate safety performance related to the CRL project. Review of appropriate metrics, tracking and monitoring of related Assessment Tracking System (ATS) items and other identified improvement opportunities that the CRL project needs to address to continue to demonstrate continuous improvement in safety performance will be included in this ISM Continuous Improvement Agenda.

These items represents a set of issues that need to be addressed during FY 2007 to improve ES&H performance related to the CRL project. Those key issues where improvement is needed include:

**Issue:** Project-Specific FRB Appointment Letter- The CRL project Director and the ES&H Manager have not officially designated or assigned discipline-specific ES&H SMEs to the project design review function, as noted in section 2.1.2.2 of the ISM Plan.

**Commitment:** The CRL project Director and ES&H Manager will execute an appointment letter that addresses this issue no later than January 30, 2007.

**Expected Improvement:** Better understanding of the function of the ES&H design review function is expected to be articulated in this document.

**Measure of Effectiveness:** Positive feedback from ISM Plan reviewers acknowledging appointment of the review team.

**Issue:** Use of Feedback and Improvement - Feedback and Improvement processes need to continue to improve as it relates to the implementation of the project's self-assessment plan.

**Commitment:** The feedback and improvement plan and assessment execution will continue to mature, leading to a more effective and efficient assessment process.

**Expected Improvement:** The project will demonstrate effective use of assessment results leading to better performance.

**Measure of Effectiveness:** The project assessment plans and assessment results will be used to measure the performance of diverse assessments that ensure effective and efficient feedback and improvement.

The action plan to meet these commitments will be documented in ATS by January 30, 2007.